



HD28

M414

no. 1107-80

c. 2



A RISK/RETURN PARADOX FOR STRATEGIC MANAGEMENT

Edward H. Bowman

WP 1107-80

March 1980

A RISK/RETURN PARADOX FOR STRATEGIC MANAGEMENT

Edward H. Bowman

WP 1107-80

March 1980

To be published in the Sloan Management Review
Spring, 1980

A RISK/RETURN PARADOX FOR STRATEGIC MANAGEMENT

by Edward H. Bowman

Abstract

The total set of industries from Value Line is used to demonstrate that business risk and return are negatively correlated across companies within industries. Some empirical questions about industries themselves are also raised. The concepts of income smoothing and corporate strategy are utilized to explain this apparent paradox. Further work is both suggested and elaborated.

A Risk/Return Paradox for Strategic Management

by Edward H. Bowman*

Strategic management is concerned with choosing environmental domains, determining the nature of the interactions with these domains, and making the internal adjustments suggested or required by these choices. An organizational and hierarchical way of capturing these activities, and differentiating among them, is to analyze the issues of corporate strategy, of business strategy, and of functional strategy.[1]

One of the major elements present at all three stages of strategic decision making is resource commitment in its various generic investment forms. Examples would be a) acquisition of a company in an unrelated product/market - at the corporate level, or b) mounting a substantial research and development program to reposition a product line - at the business level, or c) beginning a different promotion and advertising program for a product in the mature stage of its life cycle - at the functional level.

Ideas about the risks and returns associated with strategic resource commitments, or generic investments, at all three organizational levels supply the motivation for this research paper, one of a series dealing with the study of company differences within industries.[2]

Risk/Return

A great deal of both theoretical and empirical analysis has recently been addressed to the relationship between financial risk and return. Most

* Many colleagues and students at both M.I.T. and Ohio State University have helped with this research; most helpful have been Dan Skrzypek, Barbara Barnhart, Michael Treacy, Professor Andrew Chen, and anonymous referees elsewhere.

of this work has dealt with security markets, though some has also addressed the corporation itself. Such analysis has both interest in its own right as well as influencing approaches to public policy questions like concern for capital formation and its associated effects.

This paper explores some recent empirical work at the level of the firm and the industry, rather than the more popular stock market domain. Though paradox may be in the eye of the beholder, some interesting associations between risk as currently measured and profits at the level of the firm are explored here.

An academic interest in the associations between risk, uncertainty and profit goes back many years. Professor Paul Samuelson in Economics[3] both describes profits and elaborates their possible misspecification, e.g. inflation effects. He includes uncertainty associated profits in his discussion citing Professor Frank Knight's early work. Professor Frank H. Knight in Risk, Uncertainty and Profit[4] while discussing misspecification of profits and dwelling on the uncertainty aspect makes the extremely interesting comment, "The writer is strongly of the opinion that business as a whole suffers a loss." While perhaps oversimplifying the case here, and contrary to some popular impressions, Knight does not appear to say that uncertainty ex ante either causes or justifies profit, though it may in part explain some profits ex post. As Knight indicates "Profit (when positive) is not the price of the service of its recipient, but a 'residual,' the one true residual in distribution."^[5]

From current economic theory and from recent theoretical and especially empirical work in finance one gets the impression that risk must carry its own reward. The argument of/for economic rationality suggests that because

the typical business executive is risk averse the higher risk project/investment will require a higher expected return, at least ex ante, or it won't be undertaken. The following are typical quotations to this effect:

- a) Samuelson states, "Many economists think that businessmen on the whole act as if they dislike mere riskiness and hence they must on the average be paid a positive premium or profit for shouldering risks."^[6] Also, more recently, he "worries that businessmen could find themselves in a 'risk trap.' 'An increase in uncertainty could lower the expected value of an investment, when corrected for risk...below the rate required by investors with a resulting fall off in capital spending.'^[7]
- b) A Harvard Business Review article by Conrad and Plotkin states, "And in considering capital and other investments, managers in the industrial sector of the economy as a matter of course weigh risk and return together."^[8]
- c) A standard textbook in finance by Solomon and Pringle states, "For a typical (average-risk) project undertaken by a firm, the required risk premium equals the firm's risk premium... For projects involving higher or lower risks the risk premium equals the firm's risk premium...times the ratio of project risk to firm risk...."^[9]
- d) Caves, in American Industry: Structure, Conduct, Performance, states under the topic, Risk Avoidance, "they (the managers) might go for the quiet life. This could mean that they avoid risky projects that could turn out to be very profitable, settling instead for a smaller but more certain profit" and later, "The evidence seems to show that equity capital does demand a somewhat higher rate of return where risks are higher - where firms' fortunes vary wildly, or where profits fluctuate a lot from year to year."^[10]
- e) Armour and Teece in a Bell Journal of Economics article state, "...economic theory suggests that the rate of return associated with a particular asset is a function of the risk inherent in the asset, and (assuming risk aversion) the greater the risk, the greater the expected return."^[11]
- f) Christensen, Andrews, and Bower in Business Policy: Text and Cases write, "Is the chosen level of risk feasible in economic and personal terms? Strategies vary in the degree of risk willingly undertaken by their designers. For example, a small food company in pursuit of its marketing strategy, deliberately courted disaster in production showdowns and in erratic behavior of cocoa prices. But the choice was made knowingly and the return was likely to be correspondingly great."^[12]

While both business administration and economics theory and literature, such as that quoted above, maintain that there is a positive association between risk and returns, this paper discusses some evidence which throws this association into question. While undertaking some previous empirical work it appeared that not only is risk not associated with higher profits/returns, it is actually (ex post) associated with lower profits/returns. Here then is the apparent paradox which will be further developed in this paper. The earlier work referred to centered on several comparative studies of companies within an industry (e.g. food processing and computer peripherals).[13] Taking one industry at a time has the great advantage of "controlling for" the many between industry differences of which growth, cyclical, capital intensity, regulation, and concentration/market structure are some of the more important.[14]

Risk is the concept which captures the uncertainty, or more particularly the probability distribution, associated with the outcome of resource commitments. Aggregating the results from these resource commitments will produce variance in returns both cross-sectionally and longitudinally. While the risk may be regarded before the resource commitment (i.e. ex ante), the effects and the aggregation of numerous commitments can only be observed over time (i.e. ex post). Therefore (variance) of profit is used here as a measure of risk. Research and professional practice accept this measure of risk.

- a) Solomon and Pringle state, "Firm risk...is defined as the standard deviation of the after-tax operating return of a typical (average-risk) project."^[15]
- b) Hurdle explains, "Recent, numerous studies have tested the relationship between market structure and rate of return... several of these authors have included a risk variable or a financial structure variable or both in a linear regression

model. They have commonly represented the degree of risk by variability of profits over time."^[16]

- c) Armour and Teece define " $RISK_{it}$ = the variability (variance) of the dependent variable (rate of return on stockholders' equity, book value) associated with the i th firm in the t th period calculated on the basis of the observations in the five previous years."^[17]
- d) Shepherd states "Yearly profit variance has become a standard index of such risk, especially for empirical tests."^[18]

Profits are represented here as after-tax profit divided by stockholders' equity, labeled return-on-equity (ROE). Since ROE each year is used rather than some measure like earnings per share, it is less necessary to posit some kind of trend line, to normalize the variance calculation. Dividing yearly earnings by that year's equity offers a reasonable surrogate for this. Not only does ROE tend to normalize for trends, but it is the variable of interest here. Return on equity is not only the profit measure of primary interest to most managers and strategic planners, it is one of the more common measures of profits used in economic research, i.e.:

Fisher and Hall explain, "The term profit as used here is probably equivalent to net business income, i.e. the difference between revenues and costs. To adjust for differences in firm size, profit is usually expressed as a percentage of some base...Among the many possible measures, rate of return on net worth appears the most appropriate for studies of the risk-profit relationship."^[19]

Armour and Teece state, "A performance measure that appears to be capable of reflecting superior performance is the rate of return on stockholders' equity (after-tax profits divided by stockholders' equity). (See their convincing argument - p. 109 footnote - for why market value and return should not be used for their study.)"^[20]

Hall and Weiss argue, "We prefer the rate of return on equity to that on total capital, partly because this is the profit rate reported in Fortune, but also because it seems theoretically correct. It is what managers acting in the owners' best interests would seek to maximize."^[21]

The Empirical Results

The essence of our findings is that it was determined in the majority of industries studied that higher average profit companies tended to have lower risk, i.e. variance, over time. The empirical results from the first two industries studied (for strategic management purposes) are shown in the first tables. The number of companies are shown in each quadrant of the 2 x 2 contingency tables, based on the company's average profit and the variability of profit over the five-year period, 1972 to 1976. The split between "High" and "Low" in the 2 x 2 contingency tables is not arbitrary, but simply divides the total data set in half for both rows and columns. That is, a rank order of all companies for each characteristic - ROE and variance - was constructed and then divided at the median. Each company was then high or low on each characteristic, placing it in one of the four quadrants. Such table construction will always appear symmetrical, and the null hypothesis, i.e. no association, calls for equal numbers in each of the four quadrants.

(1) Food Processing Industry Companies

		ROE Variance	
		High	Low
Average ROE	High	9	14
	Low	14	9

(2) Minicomputer/Peripheral Industry Companies

		ROE Variance	
		High	Low
Average ROE	High	3	20
	Low	20	3

Nine additional industries were arbitrarily chosen from the Value Line[22] survey to show a test of these results, for the same period, 1972 to 1976, and in the same form showed the same relationship.

Container and Packaging Industry

		Variance	
		High	Low
<u>ROE</u>	High	5	8
	Low	8	5

Building Industry

		Variance	
		High	Low
<u>ROE</u>	High	14	17
	Low	17	14

Paper and Forest Products Industry

		Variance	
		High	Low
<u>ROE</u>	High	5	7
	Low	7	5

Multiform ("conglomerate")

		Variance	
		High	Low
<u>ROE</u>	High	7	11
	Low	10	7

Retail Stores

		Variance	
		High	Low
<u>ROE</u>	High	9	11
	Low	11	8

Banks

		Variance	
		High	Low
<u>ROE</u>	High	6	16
	Low	16	7

Metals & Mining (1)

		Variance	
		High	Low
<u>ROE</u>	High	8	6
	Low	6	8

Metals & Mining (2)

		Variance	
		High	Low
<u>ROE</u>	High	6	6
	Low	6	6

Only the Metals & Mining Industry seemed to show a positive association between average profits (over a five-year time period) and profit variability/risk. However, this is due to the fact that gold mining, of which there were four companies, all had relatively high profits and high variability. When these four were removed from the table and the table recalibrated with the medians recomputed, (and in a sense treating Gold Mining as a separate industry), the remaining companies did not show this relationship. This effect of a different industry is an interesting one and reappears shortly in this paper.

The last two of the nine industries chosen are the Basic Chemical and integrated Steel Industries.

		<u>Chemical</u>	
		Variance	
		High	Low
ROE	High	6	7
	Low	7	7

		<u>Steel</u>	
		Variance	
		High	Low
ROE	High	2	5
	Low	5	1

Both of these industries also support the basic hypothesis, though of course the Chemical Industry barely so. Rather than applying the usual statistical tests (e.g. chi-square) to the quadrants of each industry table, which would yield rather weak signals given the number of companies in each table, and the closeness of some of the results to the null hypothesis, i.e. completely equal distributions across quadrants, it makes more sense to treat the tests otherwise. The paradox being demonstrated here is the negative correlation of risk and return within industries, and this is captured by

the sum of low/high and high/low quadrants ($5 + 5 = 10$ in the Steel Industry) being larger than the sum of high/high and low/low quadrants ($2 + 1 = 3$ in the Steel Industry). If there were no correlation, randomness would result in an expectation that half of these tests would be favorable/true and half would be unfavorable/false. The binomial is the statistical test to use in this regard, (i.e. null: $p = 0.50$) but one hardly needs it because the eleven industries support the hypothesis 10 to 1 here (or 10 and $1/2$ to $1/2$ depending on one's taste in methods).

A much larger and complete test was made of these exploratory industry studies in order to confirm or refute these findings. All industries from the set of 85 covered by Value Line[23] and including 1,572 companies have additionally been analyzed, and these using a nine year period (1968-1976) for ROE mean and variance rather than five years. Of this total set of 85, 56 support the hypothesis of a negative risk/return correlation, 21 refute it, and 8 are ties. See Appendix I for this list of industries and results. The additional industry tests offer the added advantage of the longer nine year time period for ROE mean and variance calculation eliminating any brief and confounding transient phenomena. In sum, both five year periods and nine year periods support the negative correlation hypothesis/paradox beyond the statistical pale.[24] The statistical usage of contingency tables and more particularly nonparametric tests are chosen here as the basic methodology for their clarity and simplicity and in order to cope with, rather than eliminate, some of the companies with strange data points, i.e. very large measures for negative ROE where equity, E, is almost zero and/or especially sizable variance, which would tend to dominate and distort traditional ("least squares") regression/correlation/parametric tests. Similar methodology is used by others in this field for the same reasons.[25]

Somewhat more powerful nonparametric procedures of rank orders and Spearman tests have been used in a study which replicated and substantiated our findings. Treacy[26] in a currently unpublished paper both supports and extends the paradox findings reported here. His study has the advantage for a second test that it is from a different source (Standard and Poor Compustat Tapes), with a somewhat different configuration of industries (54 industries with 1,458 companies), for a slightly different ten year period (1966-1975), using a different and perhaps more powerful methodology (rank orders comparison a la Spearman), and including and controlling for a third variable which would be in the minds of many analysts[27] (size of firm, average assets).

Treacy reports, (p. 17), "The effect observed by Bowman that level and variance of return on equity are negatively associated, is evident from the data. Forty-three of the 54 industries had a correlation coefficient that was negative (Spearman rank order correlation coefficient)...a binomial test...at the .00001 level of significance." Twenty of the industry correlations were significant at the 10% level, and eighteen of the twenty had negative coefficients. Controlling for size only drops the number of negative partial correlations from 43 of 54 to 39 of 54. Treacy (abstract) writes, "Results confirm that there is a strong negative correlation between firm size and variance of return on equity and a moderate correlation between firm size and average level return on equity, but the evidence does not support the hypothesis that firm size is the major intervening (i.e. "explaining") variable between level and variance of return on stockholders' equity."

Industry Aggregations

The next intermediate step in this analysis was to mix the approximately three hundred companies from the nine démonstration/test industries arbitrarily chosen. This undifferentiated mixture showed the following results:

Companies from Nine Industries

		Variance	
		High	Low
ROE	High	72	76
	Low	76	71

This large set of mixed companies showed no real relationship between corporate risk and return, (correlation either positive or negative between ROE average and variance). This result is supported by a number of studies of an undifferentiated group of companies across industries. Shepherd reports (p. 275), "Many models and groups of firms were tested, using data from 245 large U.S. firms. Yet profit rates and variation were not related in any of them....the "risk premiums" estimated in some earlier studies have probably instead reflected market power." [28]

However, the negative correlation demonstrated within industries while apparently significant is modest, and this mixed group of companies shows no real correlation mixing within and between industries. Therefore the between industries correlation for risk and return must not be as strongly positive as both received theory and previous empirical work has suggested.

Taking all 85 of the Value Line industries at their company averages (ROE and variance), i.e. the industries themselves, shows a surprising non-correlation (or even nonsignificant negative correlation) between risk and return.

85 Industries

		Variance	
		High	Low
<u>ROE</u>	High	18	25
	Low	25	17

This is contrary to the positive correlation findings Conrad and Plotkin reported in the Harvard Business Review cited earlier here. And the reason for this apparent discrepancy can now be made clearer. Conrad and Plotkin argue:[29]

"A corporate manager bases his risk evaluation and investment decisions to a large degree on the experience of his industry. A way of picturing and quantifying an important part of that experience is by considering the scatter of returns on investment earned by the companies in the industry. We contend that industries characterized by highly dispersed profit distributions are judged by management and investors to be riskier than those characterized by compact distributions of profit rates.

We developed our measure of risk for each of 59 major S.I.C. fields of business (primarily industrial and nonfinancial) by calculating the dispersion (or variance, in mathematical terms) of return on capital of individual companies around the average return for that industry... The average of the yearly dispersions then became the 'typical risk quantity' for that industry for that period of time."

In summary, their calculation of variance (for the measure of risk) has been cross-sectional. They compute the variance between companies within an industry for one year at a time, and then average the sixteen yearly figures. A rather similar group of companies could each show enormous swings between years, and the industry by this calculation could show a very small variance - and by substitution therefore risk.

The calculation for variance in this paradox paper on the other hand has been longitudinal. A variance for each company ROE has been computed between years, and then these company figures have been averaged within each industry. Therefore, for instance, a very dissimilar group of companies which each showed mild swings between years would represent an industry with small variance.[30] This longitudinal treatment of variance is both more consistent with other analyses of risk found in the literature, and more pertinent to the questions addressed here - starting with the differences in variance between companies within industries.

A number of other studies touch on the paradox explored here, but usually not using methodologies to probe the relationship between firms industry by industry. Shepherd, and Samuels and Smyth[31] in a study of 186 British companies, show no correlation, though their studies are not within industries. Armour and Teece[32] in their petroleum industry organization structure study, Hall and Weis[33] in one version of their firm size study, Hurdle[34] in part of a leverage study, and Neumann, Böbel, and Haid[35] in part of a West German industry study show results, some not statistically significant, which support the apparent paradox of a negative association between risk and return; yet virtually all ignore, reject, or transform the results because they are a minor part of their studies - and unexpected. Cootner and Holland and Hall and Fisher show results which refute our findings,[36] though there are numerous differences in their questions, data, and methods from ours.[37] and [38]

To summarize the empirical findings here, neither the companies within industries nor the industries themselves show a positive correlation between risk and return as the initial quotations supplied in this paper imply. Companies within industries show a negative correlation (significant,

but by-and-large usually modest), and the industries show no significant correlation (or negative and non-significant).

Explanations, Speculations, and Discussion

The risk/return paradox described here deals essentially with the behavior of the firm and its managers, while it is perhaps only obliquely linked to capital and securities markets, (which are used here for both contrast and analogy).[39] It seems clear that there is an apparent contradiction (the paradox) between the posited risk aversion of a firm's managers with the implied necessary coupling between risk and return on the one hand, and the empirical results within industries of the negative correlation of risk with return on the other hand.

There would be much less agreement that the paradox described here is a puzzle in the context of securities markets and the "Capital Asset Pricing Model," (CAPM). Here the free, open, sizable and relatively "efficient" market place for securities can and does (at least seems to) compensate for anomalies in the behavior of firms. It is a well documented phenomenon that securities with a high variance in their market returns (at least the variance which is correlated with total market variance) will yield (require) higher returns to investors.[40]

To put it differently, the anomaly or paradox at the level of the firm described here can be eliminated in the shareholder markets by the pricing of securities. The firm with lower risks and higher returns (to the firm) can have its securities priced relatively higher by the securities market place, thus lowering its return to the securities buyer, which then eliminates the paradox at the level of the securities owner/buyer. In other words, market returns to the investor (gains plus dividends) will probably not capture the phenomena explored here. The "perfect" market will both compensate for and mask the effects demonstrated

in this paper. It may be argued that equilibrium conditions will tend to eliminate this discrepancy, but clearly equilibrium within the capital market place comes much more rapidly than equilibrium between the capital market place and the firm, if it comes at all.

Another equilibrium concept associated with the capital asset pricing model, that of theoretical indifference to the amount of the firm's leverage, should be dealt with here.[41] An increase in leverage, i.e. debt to equity ratio of the firm, would presumably both increase the profits (ROE) and also perhaps increase the variance of the profits over time. This would tend to counteract the empirical findings here. The paradox findings presented are all the stronger then for this latent confounding effect of leverage. Hurdles' work on leverage[42] and risk obliquely touches on this possibility.

The explanation for the negative correlation between risk and return may be that, once within an industry, good management will bring about higher returns (for that industry) and lower variance (again for that industry). Another explanation which seems less plausible is that managers aren't risk averse and in fact are risk favorers. They'll take higher risks even with lower returns in contrast to the opposite, because they prefer them - though this is rather unlikely and contrary to most thought on the subject. However, some economic thought on the penchant for lotteries going all the way back to Adam Smith even casts doubt on this. And Professor Knight adds, "To this bias must be added an inveterate belief on the part of the typical individual in his own 'luck,' especially strong when the basis of the uncertainty is the quality of his own judgment."^[43]

As with Sutton's push/pull theory of diversification, where empirical economic analysis seems to support the push theory, (companies leave unfavorable positions for other positions), there may be some justification for a push/pull theory of risk/return, a version of behavioral theory's "problemistic search."^[44] It may be that longitudinal analysis would show that the less profitable firms (and in some cases the unprofitable firms) are pushed into making the more risky resource commitments. The more profitable firms "need" not take these risks, i.e. they are not pulled.

That "good management" will be associated with both higher profits and lower risk (longitudinal variance) may seem questionable to some. This idea is in part derived from the large and growing literature on "income smoothing" found in accounting journals,^[45] which interestingly enough does not seem to note the paradox explored here. Income smoothing is simply the apparent reduction of the differences between periods in reported income (profit). A distinction is frequently made in the literature between real and artificial smoothing - and both would tend to support the concept (and empirical finding) of a negative correlation within an industry between return and risk (ex post).

"Real" income smoothing is due to economic/physical/organizational (but not accounting) decisions made. These could include timing of particular investments like machinery and equipment, new venture expenditures, advertising, and a host of other activities. The smoothing literature makes the case that 1) this activity is in fact economic and, well done, can raise long run average profits, and that 2) successful managers have the flexibility to engage in such smoothing. Strategic management at all three levels discussed in the literature, i.e. a)

choice of domain, b) interaction with the domain, and c) internal adjustment, or a) Corporate, b) Business, and c) Functional, may directly address the economics and profit advantages associated with real income smoothing. Probably more work, both theoretical and empirical, has been done at the Functional level of production to demonstrate the advantages of smoothing than in virtually any other field.[46]

At the corporate strategic management level, Ansoff et al[47] demonstrated in early work that planners (as distinct from their absence) and planning associated with acquisition and merger activities lead to (or were associated with) more profitable company experience. Integration and lack of surprise (risk) should both increase/maintain the profit and reduce the profit variance.

"Artificial" income smoothing is due entirely to accounting adjustments of various kinds. This could be due to one-time type decisions like changes in accounting treatment of inventories. However, it can also be due to continuing and "flexible" treatment of reserves, i.e. bad debt, obsolete inventory, business closing, etc. Both the New York Times[48], and the Wall Street Journal[49] have reported highly publicized investigations into unusual accounting treatments of income between periods by such companies as Gulf and Western Industries and H. J. Heinz Company. While the two sets of alledged company behavior dramatize artificial income smoothing, much milder examples are possible which are less subject to raised eyebrows by the accounting and regulatory communities. Something above a minimum level of profitability would normally be required to indulge in this "artificial" income smoothing,[50] (especially ex ante) and hence the positive correlation between profits and profit stability or, in the terms of this

paper, the negative correlation between profits and risk.

While perhaps too big an umbrella, strategy, addressed to the management of risk rather than income smoothing, may also help explain the negative correlation between profit and risk within an industry. Market dominance within an industry deriving from an earlier strategy, which is not the same thing as either total size or traditional monopoly/profit, may permit both higher profits and lower profit variance. The big competitor drives the industry - IBM, not Honeywell (or RCA); GM, not Chrysler (or Packard). The implication here is that market dominance may simultaneously increase profits and decrease profit variance (risk). Product reputation, customer base, employee loyalty, supplier service, banker accommodation, and even government relationships could all enhance the performance of the market-dominant firms.[51]

Many actions of the firm linking higher profits with lower risks may be closer to strategic management rather than "income smoothing" per se. By focusing on "value added" in the food processing industry,[52] "good management" both increased the more successful companies' profits, and provided the niche which protected against society's, markets', and nature's vagaries. By the strategy of strong "customer orientation" in the minicomputer/peripheral industry,[53] "good management" both increased profits and protected against costly variation in new product acceptance and competitive effects. In both industries, the more profitable companies had more activity in international markets, which as a form of diversification may have reduced the variance exposure, as well as offered a wider variety of investment opportunities.

Good management, and an effective Board of Directors, can address and cope with risk and variation both inside and outside of the corporation.

While the effect inside the corporation may come from activities and choices, the effects outside the corporation may come from negotiations and cooptations, to produce the "negotiated environment" discussed by Cyert and March. [54]

Still another possible explanation for the negative correlation within an industry - the "paradox" - between risk and return (i.e. variance and average return on investment) is an asymptotic concept. If there is some maximum ROE feasible in an industry, then perhaps most variance is really variance down from this upper bound (asymptote). The larger variance is then automatically associated with a lower mean. Similarly, though not quite the same thing, certainly the occasional loss (negative ROE) would for most companies simultaneously both increase the variance and decrease the mean - something approaching a mathematical tautology.

Finally, it is possible that the "real" investment decisions both ex ante and ex post are as theory suggests, i.e. high profit means high variance and vice versa. But this may be a "long run equilibrium" phenomenon, and there may be sufficient strategic management, both planning and control, income smoothing activities, problemistic search, capital market decoupling, "aggregation effects," and measurement anomalies, some of which are described above, that they tend to overwhelm the long run investment decision effects. This overwhelming is not simply "statistical noise", however, since the negative correlation - the paradox - still holds empirically.

Further Work

In order to explore the apparent paradox described in this paper, a number of further investigations can be made:

- a) A more detailed look at one or several industries, and company behavior within the industry, can be undertaken. What explains or is associated with the placement of companies in one of the four quadrants in the risk/return table? Using methodology more akin to the intensive annual report investigations in the food industry and the minicomputer/peripheral industry, it may be possible to throw more light on the "paradox." The choice of operational surrogate variables derived from the discussion in the previous section of this paper, combined with the appropriate metrics for empirical investigation, should help in understanding these phenomena. Implications or policy recommendations for managers might then follow. For instance, if one could believe that there were a causal link between the characteristics of lower risk, or at least lower variance, and higher profit within an industry, which characteristic should strategic management first seek instrumentally? Would such a search be better directed at operating decisions, or administrative decisions, or institutional decisions?
- b) An investigation of the approximately one-quarter of the industries (less if "coefficient of variation" is used) with an apparent positive company correlation between risk and return might prove useful. What distinguishing characteristics mark these industries? Relatively few of these industries are in manufacturing. Many of them seem to be in sectors such as utilities and service industries, (i.e. Fast Food, Insurance, Natural Gas, Electric Utilities, Railroads, Retail and Specialty Stores, Medical and Health Services). There is some evidence that regulated

industries are more prone to show this company positive correlation between risk and return. Perhaps utilities which must return to the market place frequently for equity capital show this tendency. Characteristics like phase of industry life cycle or levels of industry concentration may also help explain or identify this minority category.

- c) A more traditional (i.e. since the 1960's) extension of the empirical findings described here would be still another test of securities markets and the "efficient market hypothesis." Given that a negative correlation between risk and return (to the firm) within industries is established here, in what way, if any, does this idea/concept carry over into the capital markets? It is unlikely - though not impossible - that a "market imperfection" would be discovered. However, it may be useful to find the appropriate place within the growing capital asset pricing model (CAPM) literature for the empirical findings noted here.
- d) The important linkage between the descriptive theory of security markets and the normative theory of corporate capital budgeting may still be rather poorly understood, and the not insignificant proportion of corporate capital needs served by retained earnings tends to obscure this linkage. The empirical findings of this paradox paper may throw into some question the simple connection that economists, financial analysts, and strategic planners may currently draw between capital markets and capital budgets. Both the theoretical questions and the measurement problems in

the relationships between ex ante "expectations" and ex post "realizations" may add to the difficulty of productively exploring these connections/linkages. Further work on theory, methodology, and practice associated with this linkage should prove useful.

All of these theoretical and empirical questions can be explored by additional analysis. For both the manager and the scholar, further questions of validity, generality, and operability must be answered by future research.

APPENDIX I

Value Line 1968 - 1976 Company Average ROE and variance,

85 Industries Ranked by Negative Association Ratio*

**	<u>A</u>	<u>B</u>	<u>C</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>A</u>	<u>B</u>	<u>C</u>
Auto & Truck (7)		6.0		Apparel (30)		2.0	Tire & Rubber (12)		1.0
Distilling (7)		6.0		Specialty Steel (6)		2.0	Auto Parts (Rep.) (16)		1.0
Finance (14)		6.0		Integ. Petroleum (47)		1.9	Lead, Zinc,		
Advertising (7)		6.0		Food Processing (50)		1.9	Minor Metals (14)		1.0
Cement (12)		5.0		Metal/Fabrica -			Auto Parts (Orig) (12)		1.0
Machine Tool (17)		4.7		ting (19)		1.7	Soft Drink (8)		1.0
Aerospace Divers. (27)		4.4		Drug Store (16)		1.7	Sugar (8)		1.0
Broadcasting (10)		4.0		Telecommunications (16)		1.7	Recreation (24)		1.0
Real Estate (10)		4.0		Paper/Forest Prod. (25)		1.7	Retail Stores (33)		.90
Air Trans. (18)		3.5		Securities Broker (10)		1.5	Elect. Equip. (35)		.84
Grocery Store (26)		3.3		Travel Services (10)		1.5	West. Utility (13)		.80
Integ. Steel (13)		3.3		Coal & Uranium (10)		1.5	Fast Food (19)		.70
Maritime (8)		3.0		Bank (45)		1.5	Insurance/P C (10)		.67
Brewing (8)		3.0		Electronics (31)		1.4	Natural Gas (55)		.67
Reit (3)		3.0		Drug (Ethical) (14)		1.3	Oilfield SRV/		
Real Estate (11)		2.7		Toiletries/Cosmetics (14)		1.3	Equip. (20)		.67
Multiform (33)		2.7		Proprietary Drug (7)		1.3	Home Products (10)		.67
Mobile Home (11)		2.7		Home Appliance (14)		1.3	Health/Hosp. (15)		.67
Personal Serv. (11)		2.7		Newspaper (7)		1.3	Midwest Elec. Util. (51)		.65
Const. & Mining				Publishing (18)		1.3	West. Railroad (11)		.57
Mach. (14)		2.5		Midwest Bank (11)		1.2	U. S. Shoe (11)		.57
Special Chem (17)		2.4		Bldgs/Con-			Oil Producing (11)		.57
Trucking & Bus (23)		2.3		struction (63)		1.2	Gen. Metals/		
Industrial Srv. (18)		2.0		Packaging/			Mining (27)		.50
Meat Pack. (6)		2.0		Container (26)		1.2	Medical Services (6)		.50
Tobacco (?)		2.0		Electric Utility (35)		1.1	General Steel (13)		.44
Railroad (East) (9)		2.0		Savings & Loan (15)		1.1	Diversified Ins. (20)		.43
Agric. Equip. (6)		2.0		Textile (21)		1.1	Ind. Gas/Fertilizer (7)		.40
Toys & School				Basic Chem. (27)		1.07	Retail (Spec.) Stores (16)		.33
Supplies (9)		2.0		Machinery (47)		1.04	Life Insurance (17)		.31
Office Equip/				Precision Instr (32)		1.0	Railroad Equip. (6)		
Computer (42)		2.0							0.0

* Two by Two Contingency table; High/Low plus Low/High divided by High/High plus Low/Low; (Less than 1.0 is Positive Association)

** (A) Industry Name, (B) Number of Companies in Industry, (C) Negative Association Ratio

References

- [1] Peter Lorange and Richard F. Vancil, Strategic Planning Systems, Prentice Hall, 1977
- [2] E. H. Bowman, "Epistemology, Corporate Strategy and Academe", Sloan Management Review, Winter 1974, pp. 35 - 50; E. H. Bowman and M. Haire, "A Strategic Posture Toward Corporate Social Responsibility," California Management Review, Winter 1975, pp. 49 - 58; E. H. Bowman, "Strategy and the Weather," Sloan Management Review, Winter 1976, pp. 49 - 62, E. H. Bowman, "A Risk/Return Paradox," College of Administrative Science, Ohio State University, Working Paper, 1977, E. H. Bowman, "Strategy, Annual Reports, and Alchemy," California Management Review, Spring 1978, pp. 64 - 71.
- [3] Paul Samuelson, Economics, McGraw-Hill 1951, pp. 639 - 647
- [4] Frank H. Knight, Risk, Uncertainty and Profit, Harper Torch Books, 1965 (from 1921), p. 365
- [5] Knight, op. cit., page lxii, Preface for the Reprint of 1957.
- [6] Samuelson, 1961, op. cit., p. 666.
- [7] "The Slow-Investment Economy", Business Week, October 17, 1977, p. 62
- [8] Gordon R. Conrad and Irving H. Plotkin, "Risk/Return: U. S. Industry Pattern," Harvard Business Review, March - April 1968, p. 90.
- [9] Ezra Solomon and John J. Pringle, An Introduction to Financial Management, Goodyear Publishing Co., Inc., 1977, p. 367.
- [10] Richard Caves, American Industry: Structure, Conduct, Performance, 4th Edition, 1977, p. 4 and p. 69.
- [11] Henry O. Armour and David J. Teece, "Organization structure and economic performance: a test of the multidivisional hypothesis," The Bell Journal of Economics, Spring 1978, p. 106-122.
- [12] C. Roland Christensen, Kenneth R. Andrews and Joseph L. Bower, Business Policy: Text and Cases, 4th Edition, R. D. Irwin, 1978, p. 137.
- [13] Bowman, (1976), (1978), op. cit.
- [14] William G. Shepherd, The Economics of Industrial Organization, Prentice-Hall Inc., 1979; and Caves, op. cit.
- [15] Solomon and Pringle, op. cit., p. 367.
- [16] Gloria J. Hurdle, "Leverage, Risk, Market Structure and Profitability", Review of Economics and Statistics, November 1974, pp. 478 - 485.
- [17] Armour and Teece, op. cit., p. 110.

- [18] Shepherd, op. cit., p. 275
- [19] J. N. Fisher and G. R. Hall, "Risk and Corporate Rates of Return", Quarterly Journal of Economics, February 1969, pt. 79 - 92. (p. 84)
- [20] Armour and Teece, op. cit., p. 109.
- [21] Marshall Hall and Leonard Weiss, "Firm Size and Profitability", Review of Economics and Statistics, August 1967, pp. 319 - 331. (p. 320)
- [22] The Value Line Investment Survey, Arnold Bernhard & Co. (October 14, 1977).
- [23] An additional three or four industries which do not include ROE or are not "industries" have been excluded, such as Japanese companies and Dual Funds.
- [24] Level of significance for the binomial test ($p = 0.50$) is 0.01 for the 5 year tests, and beyond 0.001 for the 85 industries nine year tests. Grouping the companies by quadrants from the nine industries, (60, 88, 60, 87), and using the chi-square test, yields a level of statistical significance of 0.018. If the normalized relative variance of ROE, labelled "coefficient of variation" and computed by dividing each variance by its mean, had been correlated with the mean ROE, this automatically accentuates, by additional empirical checking, the negative correlation which has been demonstrated here. Using solely 5 year tests rather than 9 year also accentuates the negative correlation - something also tested by additional empirical checking.
- [25] J. M. Samuels and D. J. Smyth, "Profits, Variability of Profits and Firm Size," Economica, May 1968, p. 127 - 139.
- [26] Michael Treacy, "Profitability Patterns and Firm Size", (Unpublished, MIT Sloan School), January 1980, pp. 1 - 44.
- [27] Sidney S. Alexander, "The Effect of Size of Manufacturing Corporations on the Distribution of the Rate of Return," Review of Economics and Statistics, August 1949, pp. 229 - 235, and Shepherd, op. cit.
- [28] Shepherd, op. cit.
- [29] Conrad and Plotkin, op. cit.
- [30] The differences in results between the two studies attributable to differences between return on equity (ROE) and adjusted return on total investment (RCI) would be negligible.
- [31] Samuels and Smyth, op. cit. and Shepherd, op. cit.
- [32] Armour and Teece, op. cit.
- [33] Hall and Weiss, op. cit.
- [34] Hurdle, op. cit.

References - page 3

- [35] Manfred Neumann, Ingo Böbel, and Alfred Haid, "Profitability, Risk and Market Structure in West German Industries," The Journal of Industrial Economics, March 1979, pp. 227 - 242.
- [36] Paul H. Cootner and Daniel M. Holland, "Rate of return and business risk," The Bell Journal of Economics and Management Science, Autumn 1970, pp. 211 - 226, and Fisher and Hall, op. cit.
- [37] The difference in results may be accounted for in some combination of a series of differences in either or both of the refuting studies: (1) different time periods (earlier periods including the unusually profitable decade ending in the mid '60s - Holland and Myers[38] demonstrate the atypical profits for this period), (2) different industries and companies of more restricted domain (smaller number of industries, i.e. 11 and 39, much smaller numbers of companies, i.e. 88 and 315, and only larger companies, i.e. Fortune 500), (3) aggregation of all company information in the same regression, using dummy variables for industries, (4) different measures for profits and computation of variance around a trend line, and (5) reliance on regression and parametric statistical methods which in relatively smaller samples may be swayed by outlier or unusual companies.
- [38] Daniel M. Holland and Stewart C. Myers, "Trends in Corporate Profitability and Capital Costs," pp. 103 - 188, in The Nation's Capital Needs: Three Studies, edited by Robert Lindsay, Committee for Economic Development, 1979.
- [39] Baruch Lev and Sergius Kunitzky, "On the Association Between Smoothing Measures and the Risk of Common Stocks," The Accounting Review, April 1974, pp. 259 - 270.

George W. Douglas, "Risk in the Equity Markets: An Empirical Appraisal of Market Efficiency", Yale Economic Essays, Spring 1969, pp. 3 - 45.

Ray Ball and Philip Brown, "Portfolio Theory and Accounting," Journal of Accounting Research, Autumn 1969, pp. 300 - 323.

W. H. Beaver, P. Kettler, and M. Scholes, "The Association Between Market Determined and Accounting Determined Risk Measures," The Accounting Review, October 1970, pp. 654 - 682.

- [40] Lev and Kunitzky, op. cit., Shepherd, op. cit.; Beaver, Kettler, and Scholes, op. cit.
- [41] Franco Modigliani and Merton H. Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," American Economic Review, June 1958 pp. 261 - 297.
- [42] Hurdle, op. cit., the main effect of substituting adjusted return on total assets (ROA) for return on equity (ROE) would be to dampen the effect of leverage's contrary confounding. (p. 483-4) "Debt enters the profit equation with a positive sign...that is, a firm with a high debt, other things equal, does have higher return on equity."
- [43] Knight, op. cit., p. 235.

References - page 4

[44] C. J. Suttor, "Management Behaviour and a Theory of Diversification," Scottish Journal of Political Economy, February 1973, pp. 27 - 41, and Richard M. Cyert and James G. March, A Behavioral Theory of the Firm, Prentice-Hall, Inc. 1963.

[45] Paul E. Dascher and Robert E. Malcom, "A Note on Income Smoothing in the Chemical Industry," Journal of Accounting Research, Autumn 1970.

Gary E. White, "Discretionary Accounting Decisions and Income Normalization," Journal of Accounting Research, Autumn 1970.

Lev and Kunitzky, op. cit.

[46] Charles C. Holt, Franco Modigliani, John F. Muth, and Herbert A. Simon, Planning Production, Inventories, and Work Force, Prentice-Hall, Inc., 1960, E. H. Bowman, "Consistency and Optimality in Managerial Decision Making," Management Science, January 1963, and Herbert Moskowitz and Jeffrey G. Miller, "Information and Decision Systems for Production Planning," Management Science, November 1975 and bibliography.

[47] Igor Ansoff, Richard Brandenberg, F. E. Portner, and H. R. Radosevich, Acquisition Behavior of U.S. Manufacturing Firms, 1946-65, Vanderbilt University Press, 1971.

[48] New York Times, Sunday, July 24, 1977, p. 1.

[49] Wall Street Journal, November 8, 1979, p. 1.

[50] White, op. cit., for some contra evidence, and Cyert and March, op. cit., p. 38.

[51] S. B. Thomadakis, "A Value-Based Test of Profitability and Market Structure," Review of Economics and Statistics, May 1977, pp. 179 - 185, S. Schoeffler, R. O. Buzzell and D. F. Heany, "Impact of Strategic Planning on Profit Performance," Harvard Business Review, March - April 1974, pp. 137 - 145, and Michael E. Porter, "The Structure within Industries and Companies Performance," Review of Economics and Statistics, 1978, pp. 214 - 227.

[52] Bowman, op. cit. (1976)

[53] Bowman, op. cit. (1978)

[54] Cyert and March, op. cit., and Jeffrey Pfeffer, "Size and Composition of Corporate Boards of Directors: The Organization and Its Environment," Administrative Science Quarterly, June 1972, pp. 218 - 228.

3251 006

MIT LIBRARIES



3 9080 004 493 349

Date Due

Jan. 11, 1982

Lib-26-67

3-12-1968

